Notice of Allowability	Application No.	Applicant(s)	
	10/721,670	ASAYAMA ET AL.	
	Examiner	Art Unit	
	Christian A. Hannon	2685	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *11/25/2003*.

2. ☒ The allowed claim(s) is/are *1-18*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

REASONS FOR ALLOWANCE

1. Claims 1-18 are allowed over the cited prior art

2. The following is an examiner's statement of reasons for allowance:

Regarding claim 1, Thomas (US 3,991,419) teaches an oscillator (Column 4, Lines 35-39; Thomas), a first mixer (Figure 2, Item 56; Thomas) of which high frequency signal is supplied to one input (figure 2, Item 46; Thomas), and output signal of the oscillator is supplied to the other input (Figure 2, Item 58; Thomas), an output terminal to which output from the first mixer is supplied (Figure 2, Item 92; Thomas), a second mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 70, Thomas), a first phase shifter which is connected between the other input of the second mixer and the output of the oscillator and serves to shift the phase of output signal (Figure 3, Item 110; Thomas), a first frequency phase shifter which is connected between the output of the second mixer and the output terminal and serves to shift the phase of output of the second mixer (Figure 2, Item 76; Column 8, Lines 28-41; Thomas), a third mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 80; Thomas), a second phase shifter which is connected between the other input of the third mixer and the output of the oscillator and serves to shift the phase of output signal of the oscillator (Figure 3, Item 112; Thomas), a second frequency phase shifter which is connected between the output of the third mixer and the output terminal and serves to shift the phase of the third mixer (Figure 2, Item 88; Column 8, Lines 28-41; Thomas). However Thomas fails to teach that a first oscillator phase shifter shifts the phase of output signal of the oscillator by –pi/3 radians as

against the phase of the other input of the first mixer, the first intermediate frequency phase shifter serves to shift the phase of output of the second mixer by -5pi/3 radians, the second oscillator phase shifter serves to shift the phase of output signal of the oscillator by –2pi/3 radians as against the phase of the other input of the first mixer and the second intermediate frequency phase shifter serves to shift the phase of output of the third mixer by –4pi/3 radians, and wherein each of the other input of the first mixer, the other input of the second mixer and the other input of the third mixer is provided with a limiter circuit.

Regarding claim 6, Thomas teaches an oscillator (Column 4, Lines 35-39; Thomas), M (M is a natural number 3 or over) pieces of mixers of which high frequency signal is supplied to one respective inputs and output signal of the oscillator is supplied to the other respective inputs (Figure 2, Items 56, 68, 80; Thomas), an output terminal to which each of the outputs of the respective mixers are supplied (Figure 2, Item 92; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) oscillator phase shifter which is connected between the other input of K-th (K is a natural number ranging from 1 to M with 1 added each) mixer out of the M pieces of the mixers and the oscillators and serves to shift the output signal (Figure 3, Items 100, 110, 112; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) intermediate frequency phase shifter which is connected between the output of the K-th mixer and the output terminal and serves to shift the output of the K-th mixer (Figure 2, Items 64,76,88; Thomas). However Thomas fails to teach that the K-th oscillator phase shifters serve to shift the output signal of the oscillator by –K*pi/M radians, that the K-th

intermediate frequency phase shifters serve to shift the output of the K-th mixer by –2pi + K*pi/M radians and wherein each of the other inputs of the respective mixers is provided with a limiter circuit.

Regarding claim 9, Thomas teaches an oscillator (Column 4, Lines 35-39; Thomas), a first mixer (Figure 2, Item 56; Thomas) of which high frequency signal is supplied to one input (figure 2, Item 46; Thomas), and output signal of the oscillator is supplied to the other input (Figure 2, Item 58; Thomas), an output terminal to which output from the first mixer is supplied (Figure 2, Item 92; Thomas), a second mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 70, Thomas), a first phase shifter which is connected between the other input of the second mixer and the output of the oscillator and serves to shift the phase of output signal (Figure 3, Item 110; Thomas), a first frequency phase shifter which is connected between the output of the second mixer and the output terminal and serves to shift the phase of output of the second mixer (Figure 2, Item 76; Column 8, Lines 28-41; Thomas), a third mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 80; Thomas), a second phase shifter which is connected between the other input of the third mixer and the output of the oscillator and serves to shift the phase of output signal of the oscillator (Figure 3, Item 112; Thomas), a second frequency phase shifter which is connected between the output of the third mixer and the output terminal and serves to shift the phase of the third mixer (Figure 2, Item 88; Column 8, Lines 28-41; Thomas). However Thomas fails to teach that a first oscillator phase shifter shifts the phase of output signal of the oscillator by –pi/3 radians as

against the phase of the other input of the first mixer, the first intermediate frequency phase shifter serves to shift the phase of output of the second mixer by -5pi/3 radians, the second oscillator phase shifter serves to shift the phase of output signal of the oscillator by –2pi/3 radians as against the phase of the other input of the first mixer and the second intermediate frequency phase shifter serves to shift the phase of output of the third mixer by –4pi/3 radians, and wherein there are provided a first mixer circuit of which each of the other input of the first mixer, the other input of the second mixer, and the other input of the third mixer is provided with a limiter circuit, a second mixer circuit which forms an image rejection mixer, using the first mixer and the oscillator and a switching means which is capable of switching the first mixer circuit and the second mixer circuit by signals from a switching control circuit.

With regard to claim 10, Thomas teaches an oscillator (Column 4, Lines 35-39; Thomas), M (M is a natural number 3 or over) pieces of mixers of which high frequency signal is supplied to one respective inputs and output signal of the oscillator is supplied to the other respective inputs (Figure 2, Items 56, 68, 80; Thomas), an output terminal to which each of the outputs of the respective mixers are supplied (Figure 2, Item 92; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) oscillator phase shifter which is connected between the other input of K-th (K is a natural number ranging from 1 to M with 1 added each) mixer out of the M pieces of the mixers and the oscillators and serves to shift the output signal (Figure 3, Items 100, 110, 112; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) intermediate frequency phase shifter which is connected between the output of the K-th mixer and

the output terminal and serves to shift the output of the K-th mixer (Figure 2, Items 64,76,88; Thomas). However Thomas fails to teach that all of the teachings pertain to a third mixer circuit, that the K-th oscillator phase shifters serve to shift the output signal of the oscillator by –K*pi/M radians, that the K-th intermediate frequency phase shifters serve to shift the output of the K-th mixer by –2pi + K*pi/M radians and wherein each of the other inputs of the respective mixers is provided with a limiter circuit, wherein the value of M is 4, an image rejection mixer, using parts in the third mixer circuit and a switching means which is capable of switching the third mixer circuit and the image rejection mixer by signals from a switching control circuit.

Regarding claim 11, Thomas teaches a fourth, fifth & sixth mixer circuit (Column 3, Line 67; Column 4, Lines 1-7; Thomas). Thomas fails to teach a fourth and fifth image rejection mixer, along with an oscillator phase shifter which supplies signals, phase shifted by -pi/3 radians as against signals inputted from the oscillator to the fourth mixer circuit, to the fifth mixer circuit, a sixth mixer circuit with the fourth mixer circuit and the fifth mixer circuit connected in parallel fashion, and a switching means which is capable of switching the fourth mixer circuit and the sixth mixer circuit by signals from a switching control circuit.

With regard to claim 14, Thomas teaches a pre-filter to which high frequency signal is supplied (Figure 3, Item 44; Thomas), teaches an oscillator (Column 4, Lines 35-39; Thomas), a first mixer (Figure 2, Item 56; Thomas) of which high frequency signal is supplied to one input (figure 2, Item 46; Thomas), and output signal of the oscillator is supplied to the other input (Figure 2, Item 58; Thomas), an output terminal

to which output from the first mixer is supplied (Figure 2, Item 92; Thomas), a second mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 70, Thomas), a first phase shifter which is connected between the other input of the second mixer and the output of the oscillator and serves to shift the phase of output signal (Figure 3, Item 110; Thomas), a first frequency phase shifter which is connected between the output of the second mixer and the output terminal and serves to shift the phase of output of the second mixer (Figure 2, Item 76; Column 8, Lines 28-41; Thomas), a third mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 80; Thomas), a second phase shifter which is connected between the other input of the third mixer and the output of the oscillator and serves to shift the phase of output signal of the oscillator (Figure 3, Item 112; Thomas), a second frequency phase shifter which is connected between the output of the third mixer and the output terminal and serves to shift the phase of the third mixer (Figure 2, Item 88; Column 8, Lines 28-41; Thomas), and an output terminal to which output signal of the mixer circuit is supplied (Figure 2, Item 92; Thomas). However Thomas fails to teach that a first oscillator phase shifter shifts the phase of output signal of the oscillator by –pi/3 radians as against the phase of the other input of the first mixer, the first intermediate frequency phase shifter serves to shift the phase of output of the second mixer by -5pi/3 radians, the second oscillator phase shifter serves to shift the phase of output signal of the oscillator by –2pi/3 radians as against the phase of the other input of the first mixer and the second intermediate frequency phase shifter serves to shift the phase of output of the third mixer by –4pi/3 radians, and wherein each of the other input

of the first mixer, the other input of the second mixer and the other input of the third mixer is provided with a limiter circuit and wherein the pre-filter is relieved in attenuation characteristics at frequencies that become image interfering signals and interfering signals being at a lower side of upper side part by intermediate frequency as against a frequency three times higher than the fundamental frequency of the oscillator in the mixer.

Regarding claim 15, Thomas teaches a pre-filter to which high frequency signal is supplied (Figure 2, Item 44; Thomas), an oscillator (Column 4, Lines 35-39; Thomas), M (M is a natural number 3 or over) pieces of mixers of which high frequency signal is supplied to one respective inputs and output signal of the oscillator is supplied to the other respective inputs (Figure 2, Items 56, 68, 80; Thomas), an output terminal to which each of the outputs of the respective mixers are supplied (Figure 2, Item 92; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) oscillator phase shifter which is connected between the other input of K-th (K is a natural number ranging from 1 to M with 1 added each) mixer out of the M pieces of the mixers and the oscillators and serves to shift the output signal (Figure 3, Items 100, 110, 112; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) intermediate frequency phase shifter which is connected between the output of the K-th mixer and the output terminal and serves to shift the output of the K-th mixer (Figure 2, Items 64,76,88; Thomas), and an output terminal to which output signal of the mixer circuit is supplied (Figure 2, Item 92; Thomas). However Thomas fails to teach that the K-th oscillator phase shifters serve to shift the output signal of the oscillator by –K*pi/M

radians, that the K-th intermediate frequency phase shifters serve to shift the output of the K-th mixer by –2pi + K*pi/M radians and wherein each of the other inputs of the respective mixers is provided with a limiter circuit, and wherein the pre-filter is relieved in attenuation characteristics at frequencies that become image interfering signals and interfering signals being at a lower side or upper side apart by intermediate frequency as against a frequency three times higher than the fundamental frequency of the oscillator.

Regarding claim 16, Thomas teaches a pre-filter to which high frequency signal is supplied (Figure 3, Item 44; Thomas), a mixer circuit comprising an oscillator (Column 4, Lines 35-39; Thomas), a first mixer (Figure 2, Item 56; Thomas) of which high frequency signal is supplied to one input (figure 2, Item 46; Thomas), and output signal of the oscillator is supplied to the other input (Figure 2, Item 58; Thomas), an output terminal to which output from the first mixer is supplied (Figure 2, Item 92; Thomas), a second mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 70, Thomas), a first phase shifter which is connected between the other input of the second mixer and the output of the oscillator and serves to shift the phase of output signal (Figure 3, Item 110; Thomas), a first frequency phase shifter which is connected between the output of the second mixer and the output terminal and serves to shift the phase of output of the second mixer (Figure 2, Item 76; Column 8, Lines 28-41; Thomas), a third mixer of which the high frequency signal is supplied to one input thereof (Figure 2, Item 80; Thomas), a second phase shifter which is connected between the other input of the third mixer and the output of the oscillator and serves to

shift the phase of output signal of the oscillator (Figure 3, Item 112; Thomas), a second frequency phase shifter which is connected between the output of the third mixer and the output terminal and serves to shift the phase of the third mixer (Figure 2, Item 88; Column 8, Lines 28-41; Thomas), and an output terminal to which output signal of the mixer circuit is supplied (Figure 2, Item 92; Thomas). However Thomas fails to teach that a first oscillator phase shifter shifts the phase of output signal of the oscillator by –pi/3 radians as against the phase of the other input of the first mixer, the first intermediate frequency phase shifter serves to shift the phase of output of the second mixer by -5pi/3 radians, the second oscillator phase shifter serves to shift the phase of output signal of the oscillator by –2pi/3 radians as against the phase of the other input of the first mixer and the second intermediate frequency phase shifter serves to shift the phase of output of the third mixer by –4pi/3 radians, and wherein each of the other input of the first mixer, the other input of the second mixer and the other input of the third mixer is provided with a limiter circuit and a switching means which is capable of switching the first mixer circuit and the second mixer circuit by signals from a switching control circuit, a demodulation circuit to which output signal from the mixer circuit is supplied, an output terminal to which output signal from the demodulation circuit is supplied, a detection circuit which is supplied with output signal from the demodulation circuit and detects signal quality of the high frequency signal and a switching control circuit which is inserted between the output of the detection circuit and a switching means in the mixer circuit and serves to operate the switching means in accordance with output of the detection circuit.

In regards to claim 17, Thomas teaches a pre-filter to which high frequency signal is supplied (Figure 2, Item 44; Thomas), a mixer circuit comprising a third mixer circuit comprising an oscillator (Column 4, Lines 35-39; Thomas), M (M is a natural number 3 or over) pieces of mixers of which high frequency signal is supplied to one respective inputs and output signal of the oscillator is supplied to the other respective inputs (Figure 2, Items 56, 68, 80; Thomas), an output terminal to which each of the outputs of the respective mixers are supplied (Figure 2, Item 92; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) oscillator phase shifter which is connected between the other input of K-th (K is a natural number ranging from 1 to M with 1 added each) mixer out of the M pieces of the mixers and the oscillators and serves to shift the output signal (Figure 3, Items 100, 110, 112; Thomas), K-th (K is a natural number ranging from 1 to M with 1 added each) intermediate frequency phase shifter which is connected between the output of the K-th mixer and the output terminal and serves to shift the output of the K-th mixer (Figure 2, Items 64,76,88; Thomas), and an output terminal to which output signal of the mixer circuit is supplied (Figure 2, Item 92; Thomas). However Thomas fails to teach that the K-th oscillator phase shifters serve to shift the output signal of the oscillator by –K*pi/M radians, that the K-th intermediate frequency phase shifters serve to shift the output of the K-th mixer by –2pi + K*pi/M radians and wherein each of the other inputs of the respective mixers is provided with a limiter circuit, wherein the value of M is 4 an image rejection mixer using parts in the third mixer circuit and a switching means which is capable of switching the third mixer circuit and the image rejection mixer by signals from a switching control

circuit, a demodulation circuit to which output signal from the mixer circuit is supplied, an output terminal to which output signal from the demodulation circuit is supplied, a detection circuit which is supplied with output signal from the demodulation circuit and detects signal quality of the high frequency signal and a switching control circuit which is inserted between the output of the detection circuit and a switching means in the mixer circuit and serves to operate the switching means in accordance with output of the detection circuit.

Regarding claim 18, Thomas fails to teach a high-frequency signal receiver, comprising: a pre-filter to which high-frequency signal is inputted; a mixer circuit comprising: a fourth mixer circuit formed of an image rejection mixer; a fifth mixer circuit formed of an image rejection mixer; an oscillator shared by at least the fourth mixer circuit and the fifth mixer circuit; an oscillator phase shifter which serves to supply signals, phase-shifted by -.pi./3 radian each with respect to signals inputted from the oscillator to the fourth mixer circuit, to the fifth mixer circuit; a sixth mixer circuit formed with the fourth mixer circuit and the fifth mixer circuit connected in parallel fashion; and a switching means capable of switching the fourth mixer circuit and the sixth mixer circuit by signals from a switching control circuit, wherein output signal of the pre-filter is inputted to the mixer circuit; a demodulation circuit to which output signal from the mixer circuit is inputted; an output terminal to which output signal from the demodulation circuit is supplied; a detection circuit which is supplied with output signal from the demodulation circuit and detects signal quality of the high-frequency signal; and a switching control circuit which is inserted between the output of the detection

circuit and a switching means in the mixer circuit and serves to operate the switching means in accordance with output of the detection circuit.

Claims 2-5 are allowed as they are dependent on allowable independent claim 1.

Claims 7, 8, 12 & 13 are allowed as they are dependent on allowable independent claim 6.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Spargo et al (US 6,636,730) disclose a wideband IF image rejecting receiver.

Scheck (US 6,075,980) discloses a interference suppression in RF signals.

Loper (US 5,179,730) discloses a selectivity system for a direct conversion receiver.

Karabinis (US 4,403,351) discloses a method and apparatus for distinguishing between minimum and non-minimum phase fades.

Clelland et al (US 6,819,911) disclose active interference sup0preswsor utilizing recombinant transmultiplexing.

Kotzin et al (US 5,412,690) disclose method and apparatus for receiving electromagnetic radiation within a frequency band.

Vu et al (US 6,385,442) disclose multiphase receiver and oscillator.

Thomsen et al (US 6,584,304) disclose switchable wide band receiver front end for a multiband receiver.

Shupe (US 6,486,824) discloses a tracking radar receiver.

Pau (US 6,735,426) discloses a multiple-band wireless transceiver with quadrature conversion transmitter and receiver circuits.

Loper (US 5,095,536) discloses a direct conversion receiver with tri-phase architecture.

Haubrich (US 6,671,332) discloses a zero IF receiver with reduced AM detector.

Nease et al (US 4,942,591) disclose a multiple phase PSK demodulator.

Hambley (US 4,715,047) discloses a digital differential phase shift keyed demodulator.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian A. Hannon whose telephone number is (571) 272-7385. The examiner can normally be reached on Mon. - Fri. 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christian A. Hannon
February 28, 2006

3/12/06

QUOCHIEN B. VUONG
PRIMARY EXAMINER